REMARKS

Reconsideration and further examination are requested.

Disposition of the Claims

83 claims were presented during prosecution.

Claims 1-33 were previously canceled, without prejudice or disclaimer. Claim 54 is canceled, without prejudice or disclaimer.

Claims 34-53 & 55-83 are pending in the application.

Claims 34-45 & 59-83 are withdrawn from consideration.

Claims 46-58 are rejected.

Claim 46 is currently amended, without prejudice or disclaimer. Support for each amended claim is found in the as-filed specification and as indicated below.

Claim 59 is currently amended, without prejudice or disclaimer. Support for each amended claim is found in the as-filed specification and original claim 25 from the International phase application.

This amendment adds, changes and/or deletes one or more claims in this application. A detailed listing of each claim that is, or was, in the application, irrespective of whether or not the claim remains under examination in the application, is presented, with a status identifier.

Claims 59-83 are requested to be rejoined with the elected claims.

Restriction

The Examiner maintained the restriction and seemingly misunderstood the traversal. Office action, p. 2. As noted in the traversal, in the restriction, the Examiner

failed to use the Unity of Invention standards as identified in the administrative instructions. See, e.g., Restriction, para. 8. Now there seems to be no disagreement that the Examiner is committed to following PCT 13.1-13.2, as the Examiner stated as much and that is what Applicants asked for in the traversal by identifying the restriction's paragraph 8, in which § 111 standards were used in a § 371 application.

More specifically, in Group III (claims 59-83), the special technical features is recited as a *ceria based electrolyte with a density greater than 97% of the theoretical achievable density and with a concentration of divalent cations minus an adjusted concentration of trivalent cations of between 0.02 mole % and 0.1 mole % inclusive.* In Group II (claims 46-58), the special technical features is recited as a *ceria based electrolyte with a density greater than 97% of the theoretical achievable density, the method comprising:... sintering ... such that the concentration of divalent cations minus the adjusted concentration of trivalent cations in the sintered electrolyte is between 0.01mole % and 0.1 mole % ....* These features are undisclosed and defines a contribution over the references of record.

In short, claims 59-83 (Group III) are requested to be rejoined with the elected claims such that the examined subject matter includes Groups II-III, i.e., claims 46-83.

Objections to the specification

The specification was objected to because the "specification fails to provide antecedent basis for having a sintered electrolyte having the claimed divalent cation content.... The specification makes no mention that the cation concentration refers to the sintered electrolyte." Office action, pp. 2-3. This objection is respectfully traversed.

It is believed that the Examiner will agree that the present specification repeated uses, throughout the present specification, the term densification. Spec. *passim*. It is further believed that the Examiner will agree that the present specification highlights the achievable density at temperatures of about 1000°C. For example, the Examiner is directed to the following passage of the as-filed disclosure:

> The inventors of the present invention have surprisingly found that an effective concentration of divalent cations (concentration of divalent cations – adjusted concentration of trivalent cations) of between 0.01 mole % and 0.1 mole % inclusive can be used to produce an electrolyte with a density greater than 97% of the achievable density at approximately 1000°C. Furthermore such an effective concentration of divalent cations does not produce as severe a reduction in EMF as electrolytes containing greater concentrations of divalent cations.

Spec. p. 3. The Examiner is also referred to claims 12-24, which were added to the description as shown above. (Support for each paragraph can be identified by referring to the Appendix, which shows in brackets {...} the original claim that provided support for the inserted language.) In view of these disclosures, it is unclear why the Examiner raised such a generalized objection, i.e., that "[t]he specification makes no mention that the cation concentration refers to the sintered electrolyte." Please reconsider and withdraw the present objection.

To the extent that the objection was targeted at the claims, in claim 46, the present amendment adds a more detailed antecedent in the body of the claim: *sintering the electrolyte at a temperature up to 1200°C* <u>*by a sintering process to provide a sintered electrolyte*</u>.... It is believed that no objection should be made to the claim or the specification.

Rejection 35 U.S.C. § 112, para. 2.

The claims were rejected as indefinite for two reasons. Each is addressed under a separate header.

Antecedent for *the adjusted concentration of trivalent cations*

Claims 46-58 were rejected for reciting the term *the adjusted concentration of trivalent cations*, which lacks antecedent. Office action, p. 3. The present version of the claims contain antecedent, as it recites ~~*the*~~ *an adjusted concentration of trivalent cations*. Please reconsider and withdraw the present rejection.

To the extent that the Examiner alleged that the a/the antecedent issue prevented a search of the prior art, Office action, p. 3 ("A meaningful search of the claims can't be made because the specification does not provide an explicit or implicit definition of the term "adjusted concentration of trivalent cations."), it is respectfully submitted that an a/the antecedent issue would prevent a search of the prior art.

To the extent that the Examiner paraphrases the ISR's continuation page, the paraphrased language from the ISR (in the FOAM) concerned presently non-elected subject matter, which is irrelevant to the presently elected subject matter. In fact, the ISR clearly indicates that the subject matter of claims 12-24, which would correspond to the presently elected group, has been searched.

To the extent that the Examiner requires a definition, definitions are not required. The standard is the examined claims, interpreted in light of the disclosure, reasonably apprise a person of ordinary skill in the art of the invention. Along these lines, the Examiner is referred to the as-filed application:

$[M_1^{3+}]$ represents the concentration of trivalent cations (eg Fe^{3+}, Cr^{3+}, Al^{3+}, etc) determined to be in the electrolyte after the fabrication processes. The concentration of impurities is determined as above for the determination of the concentration of divalent cations in the electrolyte after the fabrication processes without prior additions. Trivalent cations are deleterious for sintering enhancement at 1000°C.

Y represents a multiplying factor (typically 5-10). The presence of trivalent cations is very deleterious for the sintering process and so their actual concentration has to be multiplied by the factor Y to take account of their severe impact on the sintering behaviour. It can also be necessary to vary the value of Y according to the nature and distribution of the trivalent cations. For example, the influence of Al^{3+} in discrete Al_2O_3 particles introduced during milling processes, differs from the role of Al^{3+} interfacial species widely distributed over the surface of the CGO powder.

p. 7, and the following examples. See, e.g., Tbl 1 $Y[M_i^{3+}]$ %. Please reconsider and withdraw the present rejection.

Relative term-*thick*

Claim 58 was rejected for reciting the term *thick*, which is a relative term. Office action, p. 3. As the Examiner should agree that relative terms do not necessarily raise issues of indefiniteness. MPEP § 2173.05(b). Here, a relevant issue is whether one of ordinary skill in the art, in view of the status of the art, would be nevertheless reasonably apprised of the scope of the invention. Id. As evidence of the status of the art, Applicants provide an extract from the *ASM Engineered materials handbook, Vol. 4: Ceramics and Glasses*, (1991), which contains the article, *Thick Film Circuits–Charles C.Y. Kuo.*

> Originally, the difference between thin films and thick films was defined by the film thickness. The usable film thickness range from vacuum deposition is between 10 and 500 nm (100 and 5000 Å). On the other hand, the thickness of thick film is in the range of 10 to 25 μm (400 to 1000 μin.). Therefore, in general, the thickness of a thick film is about two orders of magnitude greater than that of a thin film.

(Enclosed for consideration per MPEP § 609.05(c)). Based on this evidence, the term thick would have reasonably apprised one of ordinary skill in the art, in view of the status of the art, of the scope of the invention. Please reconsider and withdraw the present rejection.

Conclusion

A notice of allowance is requested.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,

LOWE HAUPTMAN HAM & BERNER, LLP

/Sean Allen Passino, reg. no. 45943/
Sean A. Passino, reg. no. 45943 for
Benjamin J. Hauptman
Registration No. 29,310

1700 Diagonal Road, Suite 300
Alexandria, Virginia 22314
(703) 684-1111
(703) 518-5499 Facsimile
Date: 09-08-2010
BJH:SAP/tal

Enclosure :*ASM Engineered materials handbook, Vol. 4: Ceramics and Glasses*, (1991), which contains the article, *Thick Film Circuits–Charles C.Y. Kuo*. (Enclosed for consideration); & Appendix.

Appendix

This Appendix contains an annotated copy of the amended part of the present specification and shows which originally filed claims support the inserted language, between curly brackets ({…}). Please do not view this as an improper Rule 121 amendment.

In some embodiments, provided is a method of preparing a ceria based electrolyte with a density greater than 97% of the theoretical achievable density, the method comprising; providing a ceria based electrolyte and sintering the electrolyte at 1200°C or less such that the concentration of divalent cations minus the adjusted concentration of trivalent cations in the sintered electrolyte is between 0.01 mole % and 0.1 mole %. ***{claim 12}*** In some embodiments, the conditions of the sintering process are controlled to reduce at least some trivalent cations in the electrolyte into divalent cations. ***{claim 13}*** In some embodiments, the conditions of the sintering process are controlled to produce a suitable oxygen or water pressure to reduce a suitable amount of trivalent cations into divalent cations. ***{claim 14}***

In some embodiments, the electrolyte is provided on a substrate and the substrate material is selected to produce the required concentration of divalent cations minus the adjusted concentration of trivalent cations in the electrolyte. ***{claim 15}*** In some embodiments, an electrode is provided between the electrolyte and the substrate. ***{claim 16}***

In some embodiments, divalent cations are added to the electrolyte before or during the sintering process. ***{claim 17}***

In some embodiments, the concentration of divalent cations minus the adjusted concentration of trivalent cations in the sintered electrolyte is between 0.02 mole % and 0.09 mole % inclusive. ***{claim 18}*** In some embodiments, the concentration of divalent cations minus the adjusted concentration of trivalent cations in the sintered electrolyte is between 0.03 mole % and 0.08 mole % inclusive. ***{claim 19}***

In some embodiments, the concentration of trivalent cations is adjusted by multiplication by a number between 5 and 10. ***{claim 20}***

In some embodiments, the electrolyte is sintered at 1100°C or less. ***{claim 21}*** In some embodiments, the electrolyte is sintered at 1050°C or less. ***{claim 22}*** In some embodiments, the electrolyte is sintered at 1000°C or less. ***{claim 23}***

In some embodiments, the electrolyte is provided as a thick film. ***{claim 24}***